

## CLAIMS

1. A time-division synchronous wireless modem device provided at each of a plurality of wireless stations in a wireless system which transmits and receives communication packets containing a header between the individual wireless stations via one wireless channel by using, on a one-by-one basis, any of communication slots obtained through time division of a predetermined transmission cycle period by a predetermined unit transmission time, the time-division synchronous wireless modem device being characterized by comprising:

a modem unit which transmits and receives the communication packets;

a communication state determination unit which obtains a transmission cycle period and the total number of wireless stations in use each contained in a header of the received communication packet; and

a transmission timing controller which selectively determines an arbitrary one of the communication slots in a next transmission cycle period when the communication packet is not received during the entire span of the one transmission cycle period, or selectively determines the one of the communication slots to be used by estimating a vacant one of the communication slots in the next transmission cycle period from the transmission cycle period and the total number of wireless stations in use each obtained by the communication state

determination unit when the communication packet is received.

2. A time-division synchronous wireless modem device according to claim 1, characterized in that:

at least one reduced transmission cycle period composed of an integral fraction of the transmission cycle period is predetermined to allow transmission and reception to be performed based on either of the transmission cycle period and the reduced transmission cycle period; and

the transmission timing controller selects one of the transmission cycle period and the reduced cycle period, and selectively determines an arbitrary one of the communication slots in the next selected transmission cycle period or reduced cycle period when the communication packet is not received during the entire span of the selected transmission cycle period or reduced cycle period, or selectively determines the one of the communication slots to be used by estimating a vacant one of the communication slots in the next selected transmission cycle period or reduced cycle period from the transmission cycle period and the total number of wireless stations in use each obtained by the communication state determination unit when the communication packet is received.

3. A time-division synchronous wireless modem device according to claim 2, characterized by comprising a display unit which displays the transmission cycle period, the reduced cycle period, and the communication slot in use.

4. A time-division synchronous wireless modem device according to claim 2 or 3, characterized in that the transmission timing controller selectively determines the one of the communication slots to be used in the next transmission cycle period or in the next reduced cycle period based on information inputted from an outside.

5. A time-division synchronous wireless modem device according to claim 2 or 3, characterized in that the transmission timing controller selectively determines the one of the communication slots to be used in the next transmission cycle period or in the next reduced cycle period in accordance with a rule predetermined based on the selected transmission cycle period or reduced cycle period and the received communication slot.

6. A time-division synchronous wireless modem device according to claim 1 or 2, characterized in that the transmission timing controller determines, after the transmission, whether or not transmission therefrom has been performed normally from information on the total number of wireless stations contained in the header of the communication packet transmitted from another wireless station.

7. A time-division synchronous wireless modem device according to claim 1 or 2, characterized by comprising an information processing unit for dividing large-capacity information which cannot be transmitted by using one of the communication slots into data trains each transmittable by using one of the communication slots, and

characterized in that

the transmission timing controller controls a transmission timing to allow each of the data trains to be transmitted by using a vacant one of the communication slots.

8. A time-division synchronous wireless modem device according to claim 7, characterized in that the information processing unit checks the presence or absence of abnormality in any of the received data trains and requests retransmission when the abnormality is found or requests re-synthesis of the data trains when the abnormality is not found.

9. A time-division synchronous wireless modem device according to claim 1 or 2, characterized in that the transmission timing controller controls a transmission timing such that, based on a request to transmit non-periodic continuous information inputted from an outside, the communication slot is used continuously for the non-periodic continuous information preferentially to another communication.

10. A time-division synchronous wireless modem device according to claim 9, characterized in that the transmission timing controller resumes, after the transmission of the non-periodic continuous information is completed, the transmission of information transmitted on a per transmission-cycle-period basis that cannot be transmitted due to the transmission of the non-periodic continuous information.